

QUESTION 1

(a)

Time (minutes)	Number of telephone calls
$0 < t \leq 5$	12
$5 < t \leq 10$	4
$10 < t \leq 15$	6
$15 < t \leq 20$	8

(A2) (C2)

Note: Award (A2) for four correct entries, (A1) for three correct entries, (A0) otherwise.

(b) $0 < t \leq 5$

(A1) (C1)

(c) 12.5

(A1) (C1)

(d) $\frac{275}{30}$

(M1)

Note: Award (M1) for division with 275 seen.

$= 9.17 \text{ (9.16666...)}$

(A1)(ft) (C2)

Note: Follow through from their parts (a) and (c), irrespective of whether working is shown.

[6 marks]

QUESTION 2

(a) $150 \tan 50$

(M1)

OR

$\frac{150}{\tan 40}$

(M1)

$= 179 \text{ (m) (178.763...)}$

(A1) (C2)

(b) $150 \tan 50 - 150 \tan 35$

(M1)(M1)

Note: Award (M1) for $150 \tan 35$, (M1) for subtraction from their part (a).

$= 73.7 \text{ (m) (73.7319...)}$

(A1)(ft)

$= 74 \text{ (m)}$

(A1)(ft) (C4)

Note: The final (A1) is awarded for the correct rounding of their answer to (b).

Note: There will always be one answer with a specified degree of accuracy on each paper.

[6 marks]

QUESTION 3

- (a) If Alex does not play the flute then he is **either** a scientist **or** from Uruguay.

(A1)(A1)(A1) (C3)

Note: Award (A1) if... then, correct (A1) antecedent, (A1) correct consequent.

(b)

p	q	r	$\neg r$	$q \vee p$	$\neg r \Rightarrow (q \vee p)$
T	T	T	F	T	T
T	T	F	T	T	T
T	F	T	F	T	T
T	F	F	T	T	T
F	T	T	F	T	T
F	T	F	T	T	T
F	F	T	F	F	T
F	F	F	T	F	F

(A1)(A1) (C2)

- (c) Not all entries in the final column are T.

(R1) (C1)
[6 marks]

QUESTION 4

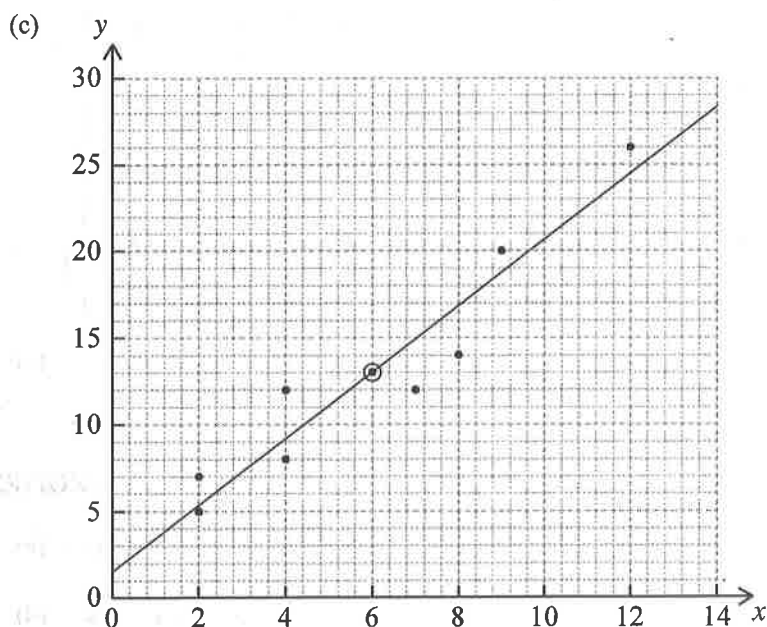
- (a) (6, 13)

(A1)(A1) (C2)

- (b) 0.952 (0.95202...)

(A2) (C2)

Note: Award (A0) for 0.9.



(A1) y intercept at $y = 1.8$ (accept between 1 and 2)

(A1)(ft) line passes through their mean point

(A1)(A1)(ft) (C2)
[6 marks]

QUESTION 5

- (a) B, F (C1)
- (b) H (C1)
- (c) F (C1)
- (d) A, E (C1)
- (e) C (C2)

[6 marks]

QUESTION 6

- (a) (i) $\sqrt{15^2 + 20^2}$ (M1)

Note: Award (M1) for correct substitution in Pythagoras Formula.

AC = 25 (cm) (A1) (C2)

- (ii) $\sqrt{12.5^2 + 30^2}$ (M1)

Note: Award (M1) for correct substitution in Pythagoras Formula.

VC = 32.5 (cm) (A1)(ft) (C2)

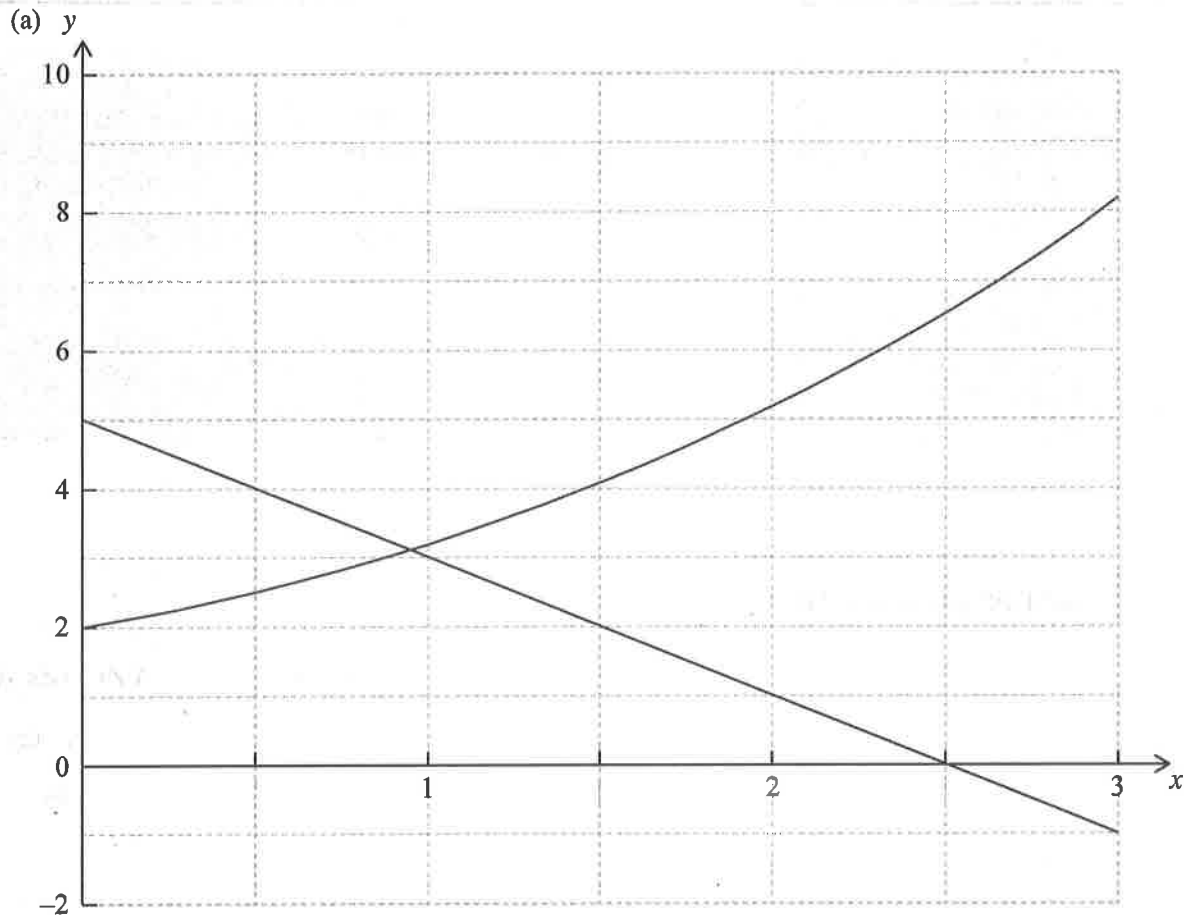
Note: Follow through from their AC found in part (a).

- (b) $\sin VCN = \frac{30}{32.5}$ OR $\tan VCN = \frac{30}{12.5}$ OR $\cos VCN = \frac{12.5}{32.5}$ (M1)
- = 67.4° (67.3801...) (A1)(ft) (C2)

Note: Accept alternative methods. Follow through from part (a) and/or part (b).

[6 marks]

QUESTION 7



Note: Award (A1) correct endpoints, (A1) for smooth curve.

(A1)(A1) (C2)

(b) (0, 2)

(A1) (C1)

Note: Accept $x = 0$, $y = 2$

(c) Straight line in the given domain
Axes intercepts in the correct positions

(A1)
(A1) (C2)

(d) $x = 0.943$ (0.94259...)

(A1) (C1)

Note: Award (A0) if y -coordinate given.

[6 marks]

QUESTION 8

- (a) $\frac{50}{120} \times \frac{35}{120} \times 120$ OR $\left(\frac{50 \times 35}{120} \right)$ (M1)
- = 14.6 (14.5833...) (A1) (C2)
- (b) 0.0746 (A2) (C2)
- (c) Since $p\text{-value} > 5\%$, the choice of the sport is independent of gender. (R1)(A1)(ft) (C2)

Note: The (R1) is awarded for the explicit comparison, the (A1)(ft) is awarded for a consistent conclusion with their answer in part (c).
It is therefore possible that (R1)(A0) may be awarded, but (R0)(A1) can never be awarded.

[6 marks]

QUESTION 9

- (a) $2x$ (AI) (C1)
- (b) 2×3 (M1)
 $= 6$ (AI) (C2)
- (c) $m(\text{perp}) = -\frac{1}{6}$ (AI)(ft)

Note: Follow through from their answer to part (b).

Equation $(y - 9) = -\frac{1}{6}(x - 3)$ (M1)

Note: Award (M1) for correct substitution in any formula for equation of a line.

$y = -\frac{1}{6}x + 9\frac{1}{2}$ (AI)(ft) (C3)

Note: Follow through from correct substitution of their gradient of the normal.

Note: There are no extra marks awarded for rearranging the equation to the form $y = mx + c$.

[6 marks]

QUESTION 10

- (a) If ABCD is a square, then ABCD has four equal sides (AI)(AI) (C2)
- Note:** Award (AI) for if...then, (AI) for propositions in the correct order.
- (b) If ABCD is not a square, then ABCD does not have four equal sides (AI)(AI) (C2)
- Note:** Award (AI) for if...then, (AI) for propositions in the correct order.
- (c) Not a valid argument. ABCD may have 4 equal sides but will not necessarily be a square. (It may be a rhombus) (AI)(RI) (C2)

Note: Award (RI) for correct reasoning, award (AI) for a consistent conclusion with their answer in part (b).
 It is therefore possible that (RI)(A0) may be awarded, but (R0)(AI) can never be awarded.

Note: Simple examples of determining the validity of an argument without the use of a truth table may be tested.

[6 marks]

QUESTION 11

11. (a) $FV = 5000 \left(1 + \frac{6.25}{1200} \right)^{3 \times 12}$ (M1)(A1)

Note: Award (M1) for substituted compound interest formula, (A1) for correct substitutions.

OR

$N = 3$

$I\% = 6.25$

$PV = -5000$

$P/Y = 1$

$C/Y = 12$

(M1)(A1)

Note: Award (A1) for $C/Y = 12$ seen, (M1) for other correct entries.

OR

$N = 36$

$I\% = 6.25$

$PV = -5000$

$P/Y = 12$

$C/Y = 12$

(M1)(A1)

Note: Award (A1) for $C/Y = 12$ seen, (M1) for other correct entries.

$= 6028.22$

(A1)

(C3)

Note: The answer should be given correct to two decimal places or the final (A1) is not awarded.

(b) $FV = 5000 \left(1 + \frac{6.25}{400} \right)^{3 \times 4}$ (M1)

Note: Award (M1) for correctly substituted compound interest formula.

OR

$N = 3$

$I\% = 6.25$

$PV = -5000$

$P/Y = 1$

$C/Y = 4$

(M1)

Note: Award (M1) for all correct entries seen.

continued...

Question 11 continued

OR

$$N = 12$$

$$I\% = 6.25$$

$$PV = -5000$$

$$P/Y = 4$$

$$C/Y = 4$$

(M1)

Note: Award (M1) for all correct entries seen.

$$FV = 6022.41$$

$$\text{Difference} = 5.80$$

(A1)

(A1)(ft)

(C3)

Notes: Accept 5.81. This answer should be given correct to two decimal places or the final (A1) is not awarded unless this has already been penalized in part (a). Follow through from part (a).

Notes: Illustrating use of GDC notation acceptable in this case only. However on P2 an answer given with no working would receive G2.

[6 marks]

QUESTION 12

(a) $\sqrt{5^2 + 12^2}$

(M1)

Note: Award (M1) for correct substitution in Pythagoras Formula.

$$= 13 \text{ (cm)}$$

(A1)

(C2)

(b) $\text{Area} = 2\pi(5)^2 + \pi(5)(13)$

(M1)(M1)(M1)

Notes: Award (M1) for surface area of hemisphere, (M1) for surface of cone, (M1) for addition of two surface areas. Follow through from their answer to part (a).

$$= 361 \text{ cm}^2 \text{ (361.283...)}$$

(A1)(ft)

(C4)

Note: The answer is 361 cm^2 , the units are required.

[6 marks]

QUESTION 13

(a) $50a + b = 37$

(A1)(A1)

(C2)

Note: Award (A1) for $50a + b$, (A1) for $= 37$

(b) $a = 0.4, b = 17$

(A1)(ft)(A1)(ft)

(C2)

Notes: Award (M1) for attempt to solve their equations if this is done analytically.
If the GDC is used, award (ft) even if no working seen.

(c) $T = 0.4(60) + 17$

(M1)

Note: Award (M1) for correct substitution of their values and 60 into equation for T .

$T = 41 (^{\circ}\text{C})$

(A1)(ft)

(C2)

Note: Follow through from their part (b).

[6 marks]

QUESTION 14

(a) $f'(x) = 15x^2 - 15x^4$

(A1)(A1)

(C2)

Note: Award a maximum of (A1)(A0) if extra terms seen.

(b) $f'(1) = 0$

(M1)

Note: Award (M1) for $f'(x) = 0$

$y = 3$

(A1)(ft)

(C2)

Note: Follow through from their answer to part (a).

(c) $(-1.38, 3) \quad (-1.38481\dots, 3)$

(A1)(ft)(A1)(ft)

(C2)

Note: Follow through from their answer to parts (a) and (b).

Note: Accept $x = -1.38, y = 3$ ($x = -1.38481\dots, y = 3$).

[6 marks]